

Item 8 WQ TAG agenda 2 August 2013.

Lake Rotorua Modelling.

Introduction.

Lake Rotorua has reached its long term TLI objective prescribed in the Water and Land Plan as calculated for 2012 (July annual average). It is expected that the lake will again meet the long term TLI when the calculation is completed in the next month or so.

This is well ahead of expectations and so it was seen as important to explain why the TLI has been achieved at this time when the catchment reductions for nitrogen have not been secured. It is presumed that alum dosing since 2007 and 2010 when the Utuhina and Puarenga alum dosing plants have been brought on line has reduced in lake total P concentrations to less than 20ppb.

There has also been some commentary that nutrient inputs to the environment from the catchment have reduced. This is mainly associated with N but no specific details of where these reductions have been achieved is available.

To get an estimate of the possible effect of alum and other possible changes in the catchment the University is now running the Rotorua Lake model with the addition of alum and some scenarios with respect to land use change. As we have no confirmed information to support the claims of land use change we have decided to undertake the modelling in a range of scenarios to see the sensitivity of the possible changes.

The process has required re running some scenarios in ROTAN to test the changes on land use output as well as adjust the output flows to account for the higher than normal rainfalls we have experienced over the past 2 years. This may have an impact on the lake model output.

The Rotan scenarios are now completed and the lake model runs are able to be run in the next 4 weeks. I am expecting that the output will be available for the next WQTAG meeting.

The proposal details and questions:

- a. Re-run ROTAN with increased rainfall in order to mimic the last year's climate.
- b. P concentrations have substantially decreased in the lake. Is this due to alum dosing and/or climate?
- c. Continue with V5 of Overseer, because if we use V6, ROTAN would need to be recalibrated. (For P, Sandy has noted that V6 predicts some surprisingly high loads from some soil types.)
- d. Undertake 3 ROTAN runs modelling:
 - a) Run 1: 50 kg N/ha/yr for dairy
 - b) Run 2: 40 kg N/ha/yr for dairy
 - c) Run 3: 60 kg N/ha/yr for dairy and +20% on what we have been using in ROTAN for drystock, i.e., $16 + 3.2 = 19.2$ kg N/ha/yr.

Various historical yields for dairy and drystock were used in ROTAN with 56 and 16 kg N/ha/yr for dairy and drystock respectively from 2001 onwards. We intend using the same historical yields up to 2000 and then switching to the ones given in a. to c. above from 2001 to 2013.